[0019] The constraint-based route validator is further adapted to interface with a photonic control plane adapted to: store values of stable properties of transmission equipment and sections in the network; and request transmission equipment status information directly from the transmission equipment. The constraint-based route validator further determines equipment availability to ensure that the at least one wavelength is available, and that the transmission equipment in the route is operating within established parameters; and, evaluates signal transmission viability across each of the at least one wavelength.

[0020] The evaluation of signal transmission viability generates parameter values for transmission equipment that are used to provide coarse-grain settings for the transmission equipment, and the constraint-based routing validator is further adapted to send respective messages to the transmission equipment directing the transmission equipment to set transmission parameters for the channel. The evaluation may involve sending a low-power test signal through the channel. Alternatively, the evaluation may involve generating a mathematical simulation of a signal transmitted through the channel, taking into account the transmission equipment in each of the sections that the channel traverses. The constraint-based routing validator is also adapted to return a message to the WRM indicating that the channel is viable.

[0021] The invention further provides a method for adaptive wavelength rerouting in a wavelength division multiplexed WDM optical network that performs wavelength selective switching, in response to a request for

transmission capacity between two network elements (A and B), comprising steps of: generating a plausible communications channel using at least one rule abstracted from physical constraints on optical signal propagation through the optical network; and verifying properties of transmission components for supporting the plausible communications channel to ensure a viability of the plausible communications channel.

[0022] The step of generating a plausible communications channel comprises steps of: selecting a route from a predefined set of routes between A and B; and selecting at least one wavelength that is unused by sections in the selected route according to wavelength utilization information.

[0023] The step of selecting a route comprises a step of evaluating each of the routes in the predefined set using at least one predefined criterion, and selecting the route that achieves a highest evaluation.

[0024] The step of evaluating each of the routes further comprises steps of: determining a value for each route at least one of a number of sections in the route, a sum of amplifiers in links in the route, a sum of lengths of the sections in the route, and, a sum of cost values associated with each section in the route; and comparing the determined values of the routes to select a route that receives an optimal value.

[0025] The step of generating further comprises a step of accounting for at least one of the following considerations: reliability of the route; existence of protection fiber along the route; and a cost of leasing the

optical fiber links in the route. The step of selecting the at least one wavelength further comprises steps of: estimating a number (R) of regeneration points required for the channel; accessing regeneration opportunity information, to derive a set of regeneration points each of which currently having capacity to regenerate the channel on the selected route; and selecting from among the set of regeneration points a set of R regeneration points that are sufficiently spread out so that distances between successive regeneration points in the route are less than a predefined wavelength span. The step of selecting from among the set further comprises steps of: generating a plurality of sets of R regeneration points; evaluating each of the plurality of sets of R regeneration points according to a predetermined criterion; and selecting the R regeneration points that achieved a highest evaluation among the sets of R regeneration points evaluated.

[0026] The step of selecting the at least one wavelength further comprises a step of selecting a respective wavelength from amid a set of wavelengths available each link between successive pairs of: A, B, and members of the selected set of R regeneration points. The step of verifying the plausible communications channel, which comprises at least one wavelength, comprises steps of, for each of the at least one wavelength: parsing the wavelength into links over which it is conveyed; retrieving parameters of transmission equipment in each of the links that the wavelength is parsed into; and determining if the transmission over the wavelength is viable.

[0027] The step of retrieving parameters comprises any one or more of: looking up a data repository containing fixed